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ABSTRACT

Educable retarded (64) and nonretarded (64) subjects (mean age 15 years) heard two stories. After each story, performance was assessed on recall and comprehension. All Ss were randomly assigned to one of four treatments: (1)knowledge (Ss were told concepts critical to processing each story); (2)purpose statements (Ss were guided in organizing incoming information); (3)knowledge plus purpose statements; and (4)control (no information). The comprehension measures included comprehension of central, noncentral, and implied story content; recall measures included recall of central and noncentral units. Comprehension factors were: (1)population (retarded vs. nonretarded); (2)treatment (knowledge, purpose statements, knowledge plus purpose statements, control); (3) placement of information (before vs. during); and (4)order of placement (before first vs. during first); and (5)question type (central, noncentral and implied). The independent variables in the analysis of recall were identical to the analysis for comprehension, except that recall unity type (central vs. noncentral) was substituted for comprehension question type. Results indicated that nonretarded Ss performed better than retarded Ss on both comprehension and recall measures. Comprehension of central questions was significantly better than comprehension of noncentral questions, which was significantly higher than comprehension of implied question. Recall of central units was superior to recall of noncentral units. Results indicated that among both retarded and nonretarded Ss comprehension scores were significantly higher in the knowledge plus purpose statement condition than in any of the other experimental conditions. Treatment effects were not significant for the recall analysis. However, several significant interactions were obtained. It was concluded that knowledge plus purpose statements has a facilitative effect on the comprehension abilities of both retarded and nonretarded Ss, but not on their recall abilities. (Author/CL)

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Symposium: Comprehension

Effect of Knowledge and Purpose Statements on Comprehension in Retarded and Nonretarded Individuals

by

Elizabeth M. Reis

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Symposium Title: Studies in Comprehension: Basic or Applied:

Paper Title: Effect of Knowledge and Purpose Statements on Comprehension and Recall in Retarded and Nonretarded Individuals

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Abstract

Retarded (64) and nonretarded (64) subjects heard two stories. After each story, performance was assessed on recall and comprehension. All subjects were randomly assigned to one of four treatments: 1)knowledge (subjects were told concepts critical to processing each story); 2)purpose statements (subjects were guided in organizing incoming information); 3) knowledge plus purpose statements; and 4)control (no information). Information was provided to subjects in treatments 1-3 before one story and during the other story. The order of information presentation (before story vs. during story) was counterbalanced so that half of the subjects in each treatment group received the before condition first, and the other half received the during condition first.

The comprehension measures included comprehension of central, noncentral, and implied story content; recall measures included recall of central and noncentral units. For the comprehension measures, a 2 x 4 x 2 x 2 x 3 analysis of variance was performed. Factors were: 1)population (retarded vs. nonretarded); treatment (knowledge, purpose statements, knowledge plus purpose statements, control); 3)placement of information (before vs. during); and 4) order of placement (before first vs. during first); and 5)question type (central, noncentral and implied). For the recall measures, a 2 x 4 x 2 x 2 x 2 analysis of variance was performed. The independent variables in this analysis were identical to the analysis for comprehension, except that recall unit type (central vs. noncentral) was substituted for comprehension question type.

Results indicated that nonretarded subjects performed better than retarded subjects on both comprehension and recall measures. Comprehension of central questions was significantly better than comprehension of noncentral questions, which was significantly higher than comprehension of implied questions. Recall of central units was superior to recall of noncentral units. Results indicated that among both retarded and nonretarded subjects comprehension scores were significantly higher in the knowledge plus purpose statement condition than in any of the other experimental conditions. Treatment effects were not significant for the recall analysis. However, several significant interactions were obtained.

It was concluded that knowledge plus purpose statements has a facilitative effect on the comprehension abilities of both retarded and nonretarded subjects, but not on their recall abilities.

Paper presented at the Annual Gatlinburg Conference on Research in Mental Retardation and Developmental Disabilities (17th, Gatlinburg, TN March 7-9, 1984)

Comprehension can truly be said to be the cornerstone of all learning. Exposure to information, regardless of the frequency of the exposure and the importance of information, is meaningless unless the receiver of the information can "get inside" it; that is, understand its significance. This can be said to be true for both listening comprehension, which this study will examine, and for reading comprehension (Alley, Gordon & Deshler, 1979; Mosenthal, 1976-77; Sachs, 1976, 1974; Sticht, 1972).

Focusing upon the study of listening comprehension in mentally retarded individuals seems justified for two reasons, both of which relate to the decoding deficiencies that have been observed in retarded persons (Birch & Belmont, 1964; Blackman, Bilsky, Burger, & Mar, 1976). First, since most retarded individuals will never become proficient readers, it is likely that they will rely heavily upon orally communicated messages throughout their lives. Second, from a research perspective, differences in efficiency of decoding the written word often complicate the meaningful interpretation of retarded/nonretarded differences in reading comprehension.

The theoretical framework for this study can best be characterized as following the Bartlett tradition (1932). According to Bartlett, our memory for prose rarely consists of an exact reproduction of what we have heard; instead, our memory for prose material is "constructive." In order to construct meaning, what Bartlett calls "effort after meaning," one attempts to

integrate newly presented information with previously presented information. One approach that has been used to assist students with this integration process in reading programs is the directed reading lesson (a series of teacher guided activities surrounding a textual selection from the students' readers). In general, the directed reading lesson consists of the following components: 1) story preparation, 2) silent reading unit preparation, 3)pictures and 4)silent reading unit questions. The directed reading lesson begins with the story preparation component, which introduces both the vocabulary and concepts that the basal authors (authors of book series that progress in level of difficulty) and potentially problematic for students. Silent reading of the story then follows. In the lower elementary grades, however, the silent reading is divided into smaller segments, referred to as silent reading units (SRUs). Before each silent reading unit, students are alerted to story events and pictures that will follow. After each SRU there are questions about that unit. In addition, there is a period of questions and discussions about the entire story.

The purpose of each component of the directed reading lesson is to facilitate the building of comprehension skill. However, when Beck, McKeown, McCaslin, and Burkes (1979) examined the suggestions for instructional practice provided in the teacher's manuals of two widely used basal reading series (Houghton Mifflin Reading Series, 1976; Ginn Reading 720 Series, 1976) they found that lesson components sometimes contained information that was either misleading or irrelevant to the story. They hypothesized that if the earlier mentioned components of the directed reading lesson

were redesigned so that lesson components did not contain misleading or irrelevant content, but instead provided both the relevant background knowledge and systematically highlighted content central to a story, the result would be better comprehension. Later, in 1982 Beck, Omanson and McKeown presented empirical support for this earlier hypothesis. The theoretical rationale for their redesign of the directed lesson approach was based upon the following assumptions; that 1) the activation or establishment of relevant background knowledge prior to reading (Anderson, Reynolds, & Schallert, 1977; Chiesi, Spilich, & Voss, 1979) and 2) highlighting central content so that students will be able to construct a story "map" of what happened in the story both facilitate comprehension.

The importance of providing relevant background knowledge prior to reading in order to facilitate comprehension is also addressed by Ausubel's (1960) subsumption theory. According to this theory, the arrangement and sequence of knowledge as it exists in a discipline is quite apart from the structure of knowledge as it exists for a learner. This suggests that the optimal presentation of learning material may be a function of the learner's existing cognitive knowledge, cognitive style, degree of retardation, or other such variables. Research within this theoretical framework has been conducted with advance organizers in an attempt to increase knowledge of the effects of cognitive structure variables and to discover more efficious ways of presenting and sequencing information.

Another theoretical framework that is relevant for the activation of background material is schema theory.

Schema theory was introduced by Bartlett (1932) to account for individual differences in subjects' delayed recalls of a narrative passage. Today, there are many variations of schema theory (e.g., Mandler & Johnson, 1977; Meyer, Brandt, & Bluth, 1980; Rumelhart, 1975; Stein & Glenn, 1979). A fundamental assumption of schema-theoretic approaches to language comprehension is that spoken or written text does not in itself carry meaning. Rather, a text only provides directions for the listener or reader as to how he should retrieve or construct the intended meaning from his own previously acquired knowledge. The words of a text evoke in the comprehender associated concepts, their past relationships and their potential interrelationships. The organization of the presented material helps the comprehender to select from among these conceptual complexes. The goal of the schema theories is to specify the interface between the comprehender and the presented material. That is, schema theories can be used to specify how the comprehender's knowledge interacts and shapes the presented information and to specify how that knowledge must be organized to support this interaction.

There is a debate in the literature (e.g., Anderson et al., 1978; Ausubel, Novak & Hanesian, 1978; Barnes & Clawson, 1975) as to whether subsumption or schema theories should be utilized to provide a clearer formulation of how meaningful learning occurs. The focus of the research in this study is to evaluate the influence of auditorily presented information on the learning and retention of a subsequently presented (also auditorily) story by educable mentally retarded and nonretarded public school children. Addressing Mayer's (1982) concern for greater definitional

clarity of the criteria for effective organizers, this study was designed to isolate and examine the effects of two components of an advance organizer, which appear to share qualities similar to the components of Beck, Omanson and McKeown's(1982) approach: 1) supplying relevant concepts within a definitional framework (knowledge) and 2) supplying a context for processing the main ideas (structure).

Method

Subjects

The subjects were 64 educable mentally retarded and 64 nonretarded students. Equal numbers of subjects (16) from each group were randomly assigned to each of the four experimental conditions. The mean chronological age (months) for the retarded subjects across all experiemental conditions was 185.72 (SD=18.11). Although IQs fell within the range 50-70, the criteria for placement in classes for the educable mentally retarded in the New York City public school system, exact IQ scores for the retarded subjects were not accessible. The retarded subjects were drawn from one elementary school, one junior high school and one high school. The student population of these schools was nearly all Black and Hispanic.

The nonretarded subjects were drawn from three fourth grade classes in two New York City public schools. The nonretarded subjects were drawn from fourth grade classes because in previous studies with this population (e.g., Bilsky, Walker, & Sakales, 1983), the menatl age of fourth graders was found to be roughly comparable to the mental age of 13 to 18 year old educable retarded subjects. The mean chronological age (months)

for the nonretarded subjects across all experimental conditions was 124.55 (SD=13.56). No IQ data for students could be obtained for the nonretarded subjects.

One-way analysis of variance performed for each group (retarded and nonretarded), revealed a significant age difference among retarded subjects in the four different treatment groups ($F=4.73$; $3.60\underline{df}$, $\underline{p} < .01$). Post-hoc Scheffé contrasts indicated that the only significant pairwise mean difference was between retarded subjects in the control condition (Mean= 175.63, SD=14.23) and those in the knowledge condition (Mean= 197.69, SD= 17.77). The analysis of variance for age differences among nonretarded subjects in different treatment groups was not significant.

Table 1 presents the means and standard deviations (SDs) for retarded and nonretarded subjects' ages (months) in each experimental condition.

Insert Table 1 about here

Design

The design corresponded to a five-way analysis of variance with three between groups factors and two within groups factors. The three between groups factors were: 1) group (retarded vs nonretarded); 2) treatment (knowledge, purpose statements, knowledge plus purpose statements, and control); and 3) order of condition (before first vs during first). The two within groups factors were: 1)placement of information (before the story vs during the story) and 2) question type (central,

noncentral, and implied).

As a supplementary analysis, a second five way analysis of variance was performed to test for effects due to story (raccoon vs donkey) and order of story (raccoon story first vs donkey story first). In this second analysis, group, treatment and order of story were between groups factors. Both story and question type were the within groups factors.

For both analyses, the dependent measure consisted of responses to a set of 24 questions, each with three choices. Of these questions, 8 tapped central content, 8 tapped noncentral content and 8 tapped implied contnet.

Material and Procedure

Stimuli consisted of taperecordings of two stories: 1)"the Raccoon and Mrs. McGinnis" (Clymer & Martin, 1976, Level 7, 824 words) and 2)"the Donkey Egg" (Clymer & Martin, 1976, Level 8, 783 words). These two stories were used previously by Beck, Omanson and McKeown (1982). In addition, subjects listened to a taperecording of 24 questions for each story. These 24 questions were selected from the 35 multiple choice comprehension items that were developed for each story by Beck et al., Each question had three response options. The questions yielded three scales for each story, each based on eigh- items. These scales represented: 1)central content; 2)noncentral content; and 3)implied content. Central content questions tap the major events and characters in the story. Noncentral content questions tap information that is not essential to the plot of the story. Implied content

questions require the responder to select an answer which is not explicitly provided in the text; in other words, the subject must make an inference to choose the correct response. Each item was scored right or wrong. The range of each scale for each story was from 0 to 8. Beck et al. provided no data on the reliability of the orginal scales. Therefore internal consistency reliability coefficients were calculated for each of the three scales, based on the study data. Cronbach's alpha was found to be .77 for the comprehension of central questions, .70 for the comprehension of noncentral questions, and .74 for the comprehension of implied questions.

Subjects were seen individually for one 35-to-40 minute session. Subjects were told that they were going to listen to a taperecording of some stories. They were told before listening to each story that they would be asked to answer questions based on the story. Immediately following the presentation of each story, the subjects were asked to respond to 24 comprehension questions. Three possible answers were presented with each question. The subjects were given instructions to listen carefully to each question, because the question would not be repeated. All questions were played on the taperecorder, and after each question and all three response choices had been played, the taperecorder was stopped and the subject was asked to give the examiner his answer. The examiner then recorded each answer given. The same procedure was followed for the second story.

For all experimental conditions, information was provided before one of the two stories, but during the other. For the Knowledge condition, subjects

were given concepts judged to be critical for the comprehension of each story. The Knowledge condition is defined as the provision of a prose passage that 1) provides concepts; not simply the definition of the concept, but its relations and usage, and 2) entails structure and content that is conrete and specific. The four concepts that made up the Knowledge condition for both the raccoon and the donkey story represent the same concepts that made up Beck et al. pre-story preparation component. For the Purpose Statements condition, subjects were given a purposeful plan for processing the story. The content of the purpose statements followed the emphasis that Beck et al. ascribed to their pre-silent reading unit preparation component. However, the method for providing the comprehender with a purposeful plan for processing the story changed from their emphasis on pictures, a series of some questions and some statements emphasizing key upcoming events to this study's emphasis on key upcoming events only, emphasized with statements such as "Listen to find out about. . . and . . . ". For the Knowledge Plus Purpose Statements condition, subjects received the sum of the Knowledge and Purpose Statements condition administered together for each story. For the Control condition, subjects listened to a taperecording of both stories with no additional information. Controls who were assigned to the information during condition had pauses inserted into the taperecording at those points where they would have received information, had they been in any of the three experiemntal conditions.

Results

The dependent variable of primary interest was the number of responses correctly given to the comprehension questions. A 2(group) x 4(treatment) x 2(order of placemnt) x 2(placement of information) x 3(question type) analysis of variance with repeated measures on the last two factors, was performed on the comprehension questions. The cell means and standard deviations for the analysis of the number of correct responses to questions are presented in Table 2.

Table 2 about here

The analysis of variance on comprehension questions yielded three significant main effects respectively for group ($F=132.73$; 1,112df, $p < .01$ for treatment ($F=9.49$; 3,112df, $p < .01$ and for questions ($F=122.06$; 2,224df, $p < .01$).

The main effect for group favored non-retarded subjects. Nonretarded subjects had a mean number of correct responses to questions of 5.74 (SD=1.64) out of a possible 8 correct per question type, while, in contrast, retarded subjects had a mean of 3.67 (SD=1.87).

The main effect for treatment indicated significant differences among treatment conditions. Subjects in the Knowledge Plus Purpose Statements condition had the highest mean score (Mean=4.20, SD=2.18). The mean for the Knowledge group was 4.73 (SD=1.91), and the mean for the Purpose Statements condition was 4.41 (SD=1.95). The post-hoc Scheffé contrasts performed on the treatment means

indicated that the comprehension of questions was significantly better under the Knowledge Plus Purpose Statements condition than under each of the other conditions. There were no other pairwise differences.

The main effect for question type indicated significant differences among question types. The highest mean score was obtained for central questions (Mean=5.62, SD=1.92), and the lowest mean score was obtained for implied questions (Mean=3.98, SD=1.91). The mean for the noncentral questions was 4.51 (SD=1.95). The post-hoc Scheffé contrasts performed on the question type means indicate that comprehension performance on central questions was significantly better than performance for each of the other question types. In addition, performance with noncentral questions was significantly better than with implied questions. There were no other significant interaction effects.

In order to assess whether the effects of the independent variables were comparable for the two stories used in the present study, an additional analysis of variance was performed. The analysis of comprehension data consisted of a 2(population) x 4(treatment) x 2(order of story) x 2(story) x 3(question type) analysis of variance with repeated measures on the last two factors. The cell means and standard deviations for the analysis fo the number of correct responses to questions by story are presented in Table 3.

Insert Table 3 about here

The main effects for group, treatment and

questions were significant and in the same direction as reported in the main analysis. In addition, a significant main effect due to story and two significant interactions involving story were obtained. The main effect for story ($F=8.70$; 1,112df, $p < .01$) favored the raccoon story. The mean number of correct responses to questions in the raccoon story was 4.85 (SD=2.13), compared to a mean of 4.56 (SD=1.94) for the donkey story.

The story by group interaction is illustrated in Figure 1.

Insert Figure 1 about here

The interaction was explicated by performing tests for the significance of the simple effects of story for the retarded and nonretarded groups separately. The tests indicated a significant difference between the two stories for the nonretarded group ($F=16.20$; 1,112df, $p < .01$), but no significant difference for the retarded group. The mean score for nonretarded subjects on the raccoon story was 6.02 (SD=1.56), compared to a mean score of 5.45 (SD=1.67) on the donkey story. Thus it may be concluded that nonretarded subjects performed better on the raccoon story than on the donkey story.

The question by story interaction is illustrated in Figure 2.

Insert Figure 2 about here

The interaction was explicated by calculating tests for the significance of the simple effects of story at each of the three separate question types. These tests indicated that the effect of story was significant only for implied questions ($F=25.69$; 1,224df, $p < .01$). The mean score on the raccoon story on implied questions was 4.36 (SD=1.95), compared to a mean score on the donkey story for implied questions of 3.59 (SD=1.81). Thus it may be concluded that performance on implied questions is superior on the raccoon story than on the donkey story.

Discussion

The major finding of the present study was a significant main effect of treatment on comprehension scores. The knowledge plus purpose statements condition enabled both retarded and nonretarded persons to answer comprehension questions more accurately than any of the other three treatment conditions. This suggests that subjects benefitted from the combination of knowledge and structure, but not from knowledge or structure alone. There has been some discussion in the literature (Mayer, 1982) regarding the specific attribute or attributes of advance organizers which account for their effectiveness. This study specifically isolated the two components of knowledge and structure to investigate this question. Knowledge refers to the provision of relevant concepts within a definitional framework. Structure refers to the provision of a context for processing ideas. The results of this study suggest that subjects require both a knowledge of relevant concepts and a context for these concepts in order to demonstrate improved comprehension.

Some of the unsuccessful advance organizer studies may have failed to include both components. It appears that if knowledge alone is provided, the question of knowing when or where this knowledge should be utilized still remains unaswered. Without the assistance of structure that will alert the comprehender to which knowledge he/she should activate for the comprehension of a story, the story may remain unintelligible, or the wrong meaning may be constructed. Similarly, experimenter-provided structure alone, without the necessary knowledge that the presented material builds upon, did not aid comprehension. Subjects may still find the story unintelligible, or they may construct incorrect meanings.

Research by Mandler and Johnson (1977), Rumelhart (1975) and Stein and Glenn (1977) has emphasized that this process of activating knowledge is important for guiding the processing and retrieval of story material. In addition, research by Schallert (1976) and Pichert and Anderson (1977) indicates that when contextual clues (titles in Schallert's study) and frame of reference (Pichert and Anderson) are manipulated, a prediction can be made about the interpretation that will be formed about presented material when knowledge is controlled. Thus these studies support the present finding that experimenter provided structure, coupled with the necessary experimenter provided knowledge, leads to increased comprehension.

Turning to the issue of group differences between retarded and nonretarded subjects, the findings showed significant main effects favoring the nonretarded group. This finding must be interpreted in the light of the fact that the nonretarded subjects were fourth graders,

selected because in previous studies with this population (e.g., Bilsky, Walker,& Sakales, 1983), the chronological age of fourth graders has been found to be roughly comparable to the mental age of 13 to 18 year-old educable retarded subjects. Main effects favoring the nonretarded group on comprehension may be the result of the different educational experiences of the two groups. Retarded subjects are typically not exposed to the same class demands as nonretarded subjects. The nonretarded subjects in the study almost certainly have had greater practice with comprehension questions.

It is most interesting that the pattern of comprehension performance differences among the question types for the nonretarded and retarded subjects was similar, despite the overall mean difference favoring the nonretarded group. Both retarded and nonretarded groups were better able to answer central questions than noncentral questions and noncentral questions than implied questions. This is most likely a function of the kinds of ideas that were stressed in the knowledge and structure components of the advance organizer. Generally speaking, both of these components were heavily weighted toward central ideas. For example, the knowledge component consisted of main relevant concepts that the basal reader authors (Clymer & Martin, 1976) judged to be crucial to understanding the story; in the structure component, the students were directed to listen for specific characters and events. Hence, the finding that the combined effects of the knowledge and structure components of the advance organizer (the treatment called knowledge plus purpose

statements) lead to superior performance on central questions may be accounted for. The superior performance on noncentral questions over implied questions may result from the relationship that noncentral question content has to central question content. For example, noncentral questions by definition (i.e., tapping details about the events and characters in the story). In addition, the difficulty of making inferences in comparison to the answering of central and noncentral fact questions may also have accounted for the subjects' relative lack of success with implied questions.

The generalizability of the effects discussed above are qualified by the following interaction involving story: 1)story x group and 2) questions x story interactions. The simple effects tests on the story x group interaction illustrate that comprehension performance for nonretarded students was better on the raccoon story than on the donkey story. This may be due in part to differences between the two stories. The raccoon story contains 53 central and 62 noncentral units, while the donkey story has 22 central and 99 noncentral units (Omanson & Formosa, 1982). Performance on the two stories did not differ for retarded students. Caution must be exercised in offering an interpretation for why comprehension performance was better on the raccoon story than on the donkey story for nonretarded students only. It may nevertheless be useful to speculate briefly about what may have accounted for this finding. One possible interpretation may follow from the fact that for retarded individuals, both basal stories were difficult. This maybe because, typically, a retarded student's exposure to reading does not center

on a basal reading approach (Payne, Polloway, Smith & Payne, 1981). However, it is not surprising that the nonretarded children, whose reading programs typically do center on basal readers, responded correctly to more multiple choice questions on the raccoon story, which is written at an easier level of comprehension. The raccoon story was taken from the second-grade materials (Level 7 of the Clymer & Martin, 1976 series),whereas the more difficult story was taken from the the third-grade materials (Level 8 of the same series).

Likewise, the simple effects tests for the question x story interaction indicate that only for the more difficult kind of question (inference, one requiring that students infer meaning beyond the presented material) did story make a difference. As expected, this difference favored the easier raccoon story.

In summary, the findings of the present study indicate that: 1)nonretarded subjects performed better on comprehension questions than retarded subjects; 2)subjects performed better in the Knowledge Plus Purpose Statements condition than in the Knowledge only, Purpose only, or Control conditions; 3)subjects demonstrated superior comprehension performance on central questions than on noncentral or implied questions; and performance on noncentral questions was significantly better than on implied questions; 4)nonretarded subjects were able to achieve higher comprehension question performance on the raccoon story than on the donkey story and 5)performance on implied questions was significantly better for both groups on the raccoon story than on the donkey story.

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Table 1

Means and Standard Deviations (SDs) for the Chronological Age of Retarded and Nonretarded Subjects in Each Experimental Condition

Groups	Conditions								F (3,60)	P
	Control		Knowledge		Purpose Statements		Knowledge/ Purpose Statements			
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.		
Retarded	175.63	14.23	197.69	17.97	185.00	19.48	184.56	14.45	4.73	.01
Nonretarded	121.69	6.46	129.44	24.06	123.06	7.17	124.00	7.99	1.01	.40

Note: n = 16 Retarded and 16 Nonretarded in each experimental condition.

Table 2

Means and Standard Deviations (SDs) for the Number of Correct Responses to Comprehension Questions for Group x Treatment x Placement x Question Type Conditions

Treatment	Central Questions				Noncentral Questions				Implied Questions			
	Before (n=16)		During (n=16)		Before (n=16)		During (n=16)		Before (n=16)		During (n=16)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Control												
Retarded	3.56	2.03	4.00	1.55	2.94	1.77	2.69	1.30	2.00	1.10	2.19	1.56
Nonretarded	6.56	1.03	6.56	1.55	5.00	1.93	4.75	2.29	4.94	1.69	5.19	1.28
Knowledge												
Retarded	4.44	1.86	4.44	1.93	3.69	1.74	3.69	1.54	3.06	.81	3.06	1.34
Nonretarded	6.50	1.32	6.56	1.15	5.75	1.39	5.13	1.59	5.69	1.14	4.81	1.56
Purpose Statements												
Retarded	4.69	1.85	3.81	1.56	3.63	1.50	3.44	1.75	2.31	1.45	2.81	1.68
Nonretarded	6.50	1.26	6.56	1.26	4.94	1.84	5.19	1.42	4.00	1.26	5.06	1.24
Knowledge plus Purpose Statements												
Retarded	6.06	1.65	5.63	1.67	4.44	1.67	4.19	1.56	4.00	1.55	3.25	1.84
Nonretarded	7.00	1.46	7.06	.93	6.19	1.76	6.50	1.32	5.63	1.54	5.63	1.15

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Table 3

Means and Standard Deviations (SDs) for Number of Correct Responses for Group x Treatment x Story Order x Story x Question Type

(page 1 of 3: Central Questions)

Treatment	Raccoon						Donkey					
	Raccoon First (N=8)		Donkey First (N=8)		Combined Orders (N=16)		Raccoon First (N=8)		Donkey First (N=8)		Combined Orders (N=16)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Control												
Retarded	3.13	1.36	3.63	2.39	3.38	1.89	4.38	1.19	4.00	2.07	4.19	1.64
Nonretarded	6.63	2.00	6.63	1.30	6.63	1.63	6.50	.76	6.50	1.07	6.50	.89
Knowledge												
Retarded	3.25	1.83	4.88	2.03	4.06	2.05	4.75	1.49	4.88	1.89	4.81	1.64
Nonretarded	6.50	1.20	7.00	1.20	6.75	1.18	6.13	1.25	6.50	1.31	6.31	1.25
Purpose Statements												
Retarded	4.13	2.23	3.63	2.00	3.88	2.06	4.00	1.07	5.25	1.28	4.63	1.31
Nonretarded	6.25	1.58	6.75	1.17	6.50	1.37	6.75	1.17	6.38	1.19	6.56	1.15
Knowledge Plus Purpose Statements												
Retarded	6.00	1.77	6.50	1.60	6.25	1.65	5.75	1.67	5.13	1.55	5.44	1.59
Nonretarded	6.88	2.10	7.25	.71	7.06	1.53	6.75	1.17	6.38	1.19	7.00	.82

Table 3 (continued)

(page 2 of 3: Noncentral Questions)

Treatment	Raccoon						Donkey					
	Raccoon First (N=8)		Donkey First (N=8)		Combined Orders (N=16)		Raccoon First (N=8)		Donkey First (N=8)		Combined Orders (N=16)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Control												
Retarded	2.25	1.28	2.50	2.14	2.38	1.71	3.38	.92	3.13	1.55	3.25	1.24
Nonretarded	5.38	1.92	6.25	1.28	5.81	1.64	3.75	2.25	4.13	2.19	3.94	2.11
Knowledge												
Retarded	4.75	1.83	2.88	1.73	3.81	1.97	3.13	.83	4.00	1.41	3.56	1.21
Nonretarded	5.00	1.69	6.25	1.17	5.63	1.54	5.63	1.60	4.88	1.36	5.25	1.48
Purpose Statements												
Retarded	3.63	2.07	3.13	1.46	3.38	1.75	4.00	1.31	3.38	1.69	3.69	1.49
Nonretarded	5.50	1.20	5.38	1.69	5.44	1.41	5.00	2.33	4.38	1.06	4.69	1.78
Knowledge Plus Purpose Statements												
Retarded	3.63	1.41	4.75	1.58	4.19	1.56	4.63	1.41	4.25	1.98	4.44	1.67
Nonretarded	6.13	2.03	6.63	1.41	6.38	1.71	5.38	1.30	7.25	.71	6.31	1.40

Table 3 (continued)

(page 3 of 3: Implied Questions)

Treatment	Raccoon						Donkey					
	Raccoon First (N=8)		Donkey First (N=8)		Combined Orders (N=16)		Raccoon First (N=8)		Donkey First (N=8)		Combined Orders (N=16)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Control												
Retarded	2.38	1.77	2.38	1.19	2.38	1.45	1.63	1.41	2.00	.93	1.81	1.17
Nonretarded	5.75	1.39	5.00	1.31	5.38	1.36	4.88	1.73	4.63	1.51	4.75	1.57
Knowledge												
Retarded	2.63	.74	4.13	1.96	3.38	1.63	2.13	1.36	3.38	1.41	2.75	1.48
Nonretarded	5.88	1.13	5.63	1.60	5.75	1.34	5.00	.93	4.50	1.69	4.75	1.34
Purpose Statements												
Retarded	3.63	1.69	2.38	1.51	3.00	1.67	2.50	1.60	1.75	1.04	2.13	1.36
Nonretarded	4.38	1.69	5.13	1.55	4.75	1.61	4.50	.93	4.13	1.13	4.31	1.01
Knowledge Plus Purpose Statements												
Retarded	4.50	1.31	3.63	2.00	4.06	1.69	3.75	1.83	2.63	1.41	3.19	1.68
Nonretarded	5.75	1.28	6.63	.74	6.19	1.11	4.88	1.13	5.25	1.58	5.06	1.34

Figure 1

Illustration of Story x Group Interaction,

for Questions

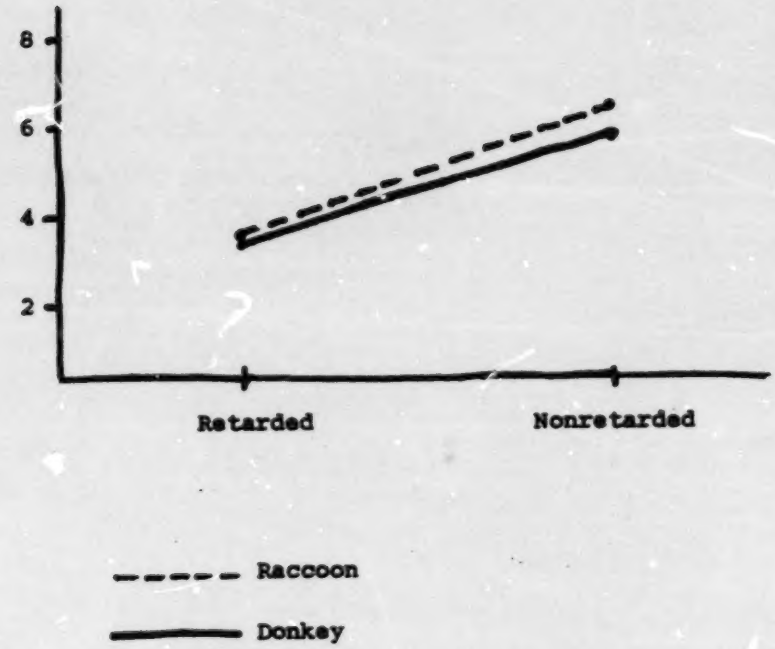

Figure 2

Illustration of Question x Story Interaction,

for Questions